

Microfluidic Chemical Analyzer for the Planned Europa Flyby Mission or a Potential Europa Lander

Completed Technology Project (2015 - 2018)



Project Introduction

The objective of this effort is to advance the TRL of spaceflight instrumentation capable of handling liquids and performing microscale organic chemical analysis on spaceflight missions to Europa.

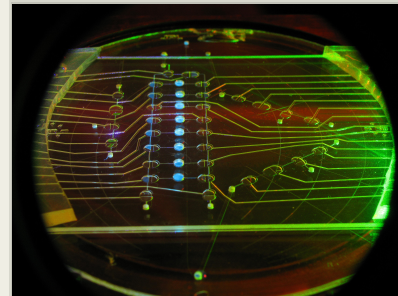
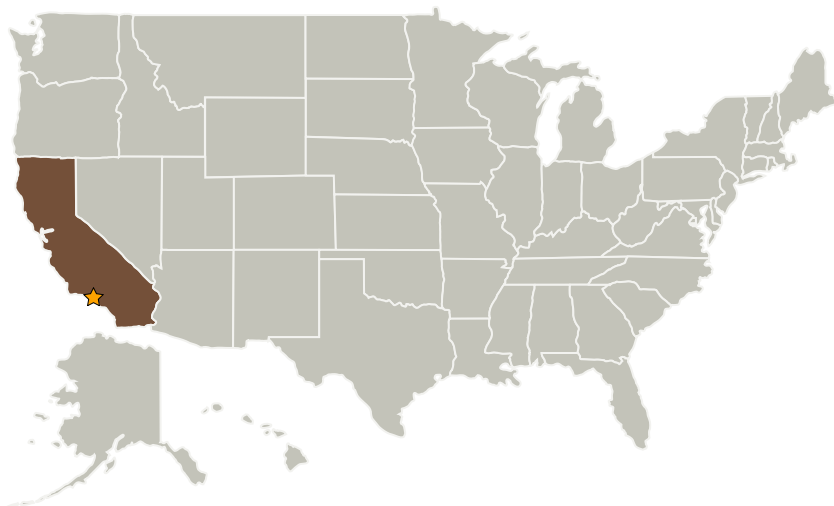
We have developed microfluidic systems to perform liquid-based analyses. The Chemical Laptop is a system for in situ organic analysis on extraterrestrial destinations with ultra-high sensitivity in a compact, low-mass, and low-power package. We have also developed a microfluidic flow injection analysis (μ FIA) system combined with ion selective electrodes (ISE) within a miniaturized microfluidic manifold to pre-analyze the liquid extracts to determine their ionic composition.

Anticipated Benefits

This technology will allow liquid-based analysis for detection of organic and inorganic species. This instrumentation is relevant to future missions to Europa, Enceladus and other ocean worlds seeking signs of life.

Modified versions of this technology could be used by NOAA for chemical oceanography.

Primary U.S. Work Locations and Key Partners



Laser-interrogated microfluidic chips are under development to search for chemical indicators of life on Europa during landed or flyby missions. Photo courtesy of Peter Willis and Fernanda Mora, JPL Microdevices Laboratory.

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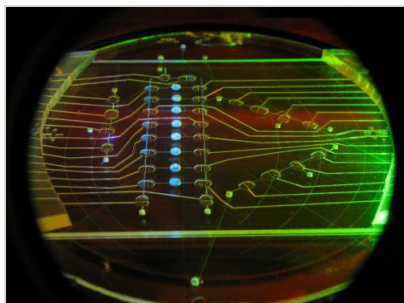


Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Images



Automation Chip

Laser-interrogated microfluidic chips are under development to search for chemical indicators of life on Europa during landed or flyby missions. Photo courtesy of Peter Willis and Fernanda Mora, JPL Microdevices Laboratory.
(<https://techport.nasa.gov/image/26131>)

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Peter A Willis

Co-Investigators:

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Technology Maturity (TRL)

Start: 4
Current: 5
Estimated End: 5



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.3 Manipulation
 - └ TX04.3.4 Sample Acquisition and Handling

Target Destinations

Foundational Knowledge, Others
Inside the Solar System

Supported Mission

Type

Push